

Difficult laparoscopic cholecystectomy: Current experience and management strategies

Difficult laparoscopic cholecystectomy

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Abstract

Aim: In the present study, the purpose was to determine the indications for transition to open surgical procedure, which is a safer method in difficult cholecystectomy, and to compare our 10-year data with the data reported in the literature.

Material and Methods: The present study was conducted with 3752 patients who were operated with the LC method in the general surgery clinic of our hospital. Gallbladder patients who underwent either elective or emergency surgery were included in the study. The demographic characteristics of the patients, laboratory data, past medical history, diagnosis and indication for surgery, reports of switching to open surgery were collected from patient files and electronic records.

Results: A total of 3752 (2815 female, 937 male) patients were included in the present study. The mean age of the patients was 55±12.7 (18-75) years. Gallbladder diseases were seen 3.0 times more frequently in women. The most common was chronic calculous cholecystitis (2755; 73.42%) which was an indication for LC. In addition, we detected acute cholecystitis, choledocholithiasis, polyp in the gallbladder, and biliary pancreatitis, in order of frequency.

Discussion: The transition from LC to open surgical procedure in difficult gallbladder diseases must be done for safe termination of surgery. LC can be performed safely by an experienced surgical team.

Keywords

Laparoscopic Cholecystectomy, Acute Cholecystitis, Choledocholithiasis, Prognosis

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Introduction

Clinical presentations of gallstone disease are quite variable. It can be detected in a wide clinical spectrum from right upper abdominal pain to sepsis [1]. Stone cholecystitis makes up an average of one-third of emergency surgical visits [2]. Laparoscopic Cholecystectomy (LC) has recently become the golden rule in the treatment of gallbladder diseases. Difficult cases such as adhesions, and inflammations as a result of adhesions in the gallbladder, anatomical variations (i.e. gallbladder aplasia), and ongoing cystic duct obstruction are still preferred to open surgery technique because of high complications and technical difficulties.

Some previous studies defined objective parameters for difficult LC, which include male gender, age > 60, recurrent attacks, elevated amylase, history of upper abdominal surgery, adhesions that mask the gallbladder, acute inflammation, and Mirizzi syndrome [3-4]. A safer surgical method must be preferred in difficult cases for successful completion of cholecystectomy. In the present study, the purpose was to determine the indications for transition to open surgical procedure, which is a safer method in difficult cholecystectomy, and to compare our 10-year data with the data reported in the literature.

Material and Methods

The present study was conducted with 3752 patients who were operated with the LC method in the general surgery clinic of our hospital between 2011 and 2021. The demographic characteristics of the patients, laboratory data, past medical history, diagnosis and indication for surgery, reports of switching to open surgery were collected from patient files and electronic records. Laboratory values were as follows: amylase (cut-off level, 19-86 U/L), lipase (cut-off level, 10 - 140 U/L), alkaline phosphatase (cut-off level, 25-100 U/L). The approval from the Medicana International Samsun Hospital Clinical Research Ethics Committee (17.06.2021-10) was obtained, and the study was conducted in line with the ethical rules based on the decision of 7150 /1. Medicana International Samsun Hospital and Surgery Clinic was opened in 2011; the hospital has maintained medical records of all patients operated on at Medicana Hospital since 2011.

Gallbladder patients who underwent either elective or emergency surgery were included in the study. All patients who were scheduled for elective cholecystectomy were admitted on the morning of the surgery date, and were allowed to have food and drink 8-10 hours before the surgery. After the gallbladder was removed, temporary drains were placed in difficult cases with a risk of postoperative bleeding. The reasons for preoperative surgery of each patient were evaluated, and the reasons for not continuing with the LC method and switching to open surgery were also recorded. Cholecystectomy was performed by using the Veres Technique in laparoscopic intervention. The peritoneal cavity was inflated with carbon dioxide, and surgery was performed using the standard four-port technique. All patients were dressed with anti-embolic stockings and low molecular heparin was used subcutaneously. Antibiotic prophylaxis was provided for some cases as perioperative 3 doses of intravenous first-generation cephalosporin. The reliability of the LC method

and its performance in treatment were discussed in the light of the literature data.

Statistics

The data were expressed as mean \pm standard deviation (SD). The Chi-Square Statistics was used for categorical data, categorical variables (n) as percentages, and unpaired Student's t-test for continuous variables. Normally distributed variables were compared with the independent sample t-test, and non-normally distributed variables were compared with the Mann-Whitney test. In statistical terms, a $p < 0.05$ was accepted to be significant. The data were analyzed with the SPSS software (Statistical Package for the Social Sciences, version 22.0, Chicago).

Ethical Approval

Ethics Committee approval for the study was obtained.

Results

A total of 3752 (2815 female, 937 male) patients were included in the present study. The mean age of the patients was 55 ± 12.7 (18-75) years. Gallbladder diseases were seen 3.0 times more frequently in women. The most common was chronic calculous cholecystitis (2755; 73.42%), which was an indication for LC. Also, there were acute cholecystitis, choledocholithiasis, polyp in the gallbladder, and biliary pancreatitis, respectively. Laboratory data and demographic characteristics of the patients are shown in Table 1. There were 3448 (91.89%) patients who underwent elective LC, and 304 (8.10%) patients who were operated on with emergency surgery indications. A total of 258 of the patients who underwent emergency surgery had acute calculous cholecystitis, 30 had choledocholithiasis, and 16 had biliary pancreatitis. It was observed that other acute calculous cholecystitis cases were treated with antibiotics, and following the acute period, choledocholithiasis and biliary pancreatitis cases caused by stones underwent endoscopic retrograde cholangiopancreatography. LC was performed after overcoming acute manifestations after antibiotic treatment. It was found that the transition rate to open cholecystectomy (OC) technique was 1.91% (n=72). Transition to the open cholecystectomy procedure was performed in most cases as a result of the inability to maintain the LC technique with inadequate exposure, difficult dissection (dense adhesions-inflammation), anatomic variations (gallbladder aplasia), uncontrollable bleeding, bile leakage, and some technical problems. The causes and frequency of transition from LC to open surgical procedure are shown in Table 2.

Bleeding was detected in 19 patients during the post-operative follow-up, and was treated conservatively with ultrasound-guided percutaneous tube drainage (n=6) and with open surgery (n=13). Biliary and subhepatic collection was detected in 24 patients in hepatobiliary ultrasonography and tomography. All these cases were treated with ultrasound-guided percutaneous drainage. The leak was detected with hepatobiliary ultrasonography in 12 patients, who were treated with ultrasound-guided percutaneous drainage (n=4) and open surgery (n=8). Common bile duct injury was detected in 8 patients with hepatobiliary ultrasonography and magnetic resonance cholangiopancreatography, and was treated with

Table 1. Clinical, laboratory and demographic characteristics of patients.

Parameters	n (%)
Age, years (mean ± SD)	55±12.7 (18-75)
Female, sex [%]	2815 (75.0)
Amylase, U/L	73.2±13.5 (32-1425)
Lipase, U/L	114.3±23.3 (22-1872)
Alkaline Phosphatase, U/L	86.6±14.8 (14-328)
Surgery indications, n (%)	
· Acute Calculous Cholecystitis	384 (10.23)
· Chronic Calculous Cholecystitis	2755 (73.42)
· Polyp in the gallbladder	189 (5.0)
· Biliary pancreatitis	116 (3.09)
· Choledocholithiasis	308 (8.20)

Table 2. Reasons and frequency of switching to open surgical procedure from laparoscopic cholecystectomy.

Reason	Frequency of switching to OS from LC among all cases, n (%)	Intragroup frequency of switching to OS from LC, n (%)
Bleeding, n (%)	13 (0.34)	13 (18)
Bile leakage, n (%)	8 (0.21)	8 (11.1)
Anatomic variation (gallbladder aplasia), n (%)	16 (0.42)	16 (22.1)
Inadequate exposure, Difficult dissection (dense adhesions-inflammation), n (%)	24 (0.63)	24 (33.3)
Common bile duct injury, n (%)	6 (0.16)	6 (8.3)
Technical problem, n (%)	5 (0.13)	5 (6.9)
Total	72 (1.91)	72 (100)

ultrasound-guided percutaneous drainage (n=2) and open surgery (n=6). Post-operative pancreatitis was detected in 6 patients with tomography and magnetic resonance cholangiopancreatography, and was treated successfully with endoscopic retrograde cholangiopancreatography and parenteral antibiotics (n = 6).

Discussion

LC is the standard treatment for acute cholecystitis and other gallbladder diseases, and is associated with a more comfortable and shorter postoperative hospital stay when compared to open cholecystectomy. LC provides many advantages over the open procedure. It is also a fact that LC has disadvantages and complications. If a case is considered to be unsafe for LC, or complications develop, the surgeon may need to switch to the open procedure. It was found in the present study that the most common reasons were inadequate exposure, difficult dissection (dense adhesions-inflammation), anatomic variations (gallbladder aplasia), and bleeding in the transition from the LC technique to the open procedure. In our study, we focused on the factors that developed in LC for the transition to open cholecystectomy method and caused that the LC method was not continued.

The rate of transition to open surgery gradually declined since the first LC in 1987 based on surgical experience and advances in devices. In current studies, this rate is reported to be between 2-11.5% [5-7]. It was seen that LC is switched to open surgery for various reasons. The most common causes are

adhesions and inflammation of the gallbladder [8]. In our study, it was found that the transition rate to open cholecystectomy technique was 1.91%. The transition from LC to open surgery is required for a safer termination of surgery.

Chronic inflammation, adhesion, and adherent gallbladder were associated with increased transition rate [7-9]. It has been shown that dense adhesions are associated with chronic inflammation and recurrent episodes of acute cholecystitis [10]. The main cause of the transition was reported as severe inflammation, which prevented the correct definition of the ductal anatomy in previous studies [11]. It was shown that the rate of transition to open surgery was 16.7-46.4% especially in dense adhesions in Calot Triangle Area [12-13]. In our study, it was found that the rate of transition to open surgical procedure was 33.3% because of inadequate exposure, difficult dissection (dense adhesions-inflammation). The rate of transition to open surgical procedure was consistent with the literature data.

Anatomical difficulties continue to challenge the use and safety of the LC in patients with anatomical variations (e.g., gallbladder aplasia). The willingness of surgeons to switch to the open cholecystectomy procedure remains important for the safety of this operation. The rate of transition to open surgical procedure was reported to be 4.3-22% in previous studies [14-15]. In our study, the rate of transition to open surgical procedure was 22.1% because of anatomic variations (e.g., gallbladder aplasia) and anatomical difficulties. The rate of transition to open surgical procedure was consistent with the literature data.

The main complications are bleeding, bile leakage, and bile duct injury in LC [16]. Previous studies have shown that 18.2% of patients switched to open surgery because of bleeding [7], which was detected in 0.68-3.7% of the patients who underwent LC [17-18]. Bleeding was detected at a rate of 0.34% in our study, and it was shown that the frequency of transition to open surgical procedure was 18%. In previous studies, common duct injury rates were 0.62-0.9% for LC [19-20]. Again, biliary leak was reported as 0.57% [21]. We found that the common bile duct injury was 0.16% and biliary leak was 0.21%, and the frequency of common bile duct injury and biliary leak was 11.1% between transitions to open surgical procedure. The low rate of bleeding, bile leakage, and injury found in our study can be explained by the clinical experience and the frequent elective surgery of the cases. It is predicted that, as the procedure becomes more widespread in studies, the rates of common duct injury after LC will decrease more [22]. It is important to identify risk factors, which require transition to open surgical procedure before the surgery. Patients must be informed about this to continue the treatment.

Conclusion

The transition from LC to open surgical procedure in difficult gallbladder diseases must be done for safe termination of surgery. LC can be performed safely by an experienced surgical team. In the event that LC cannot be performed safely, switching to OS must be initiated to minimize the risk of bile duct and/or other organ injury. Although LC is the ideal method, it is also necessary to learn the appropriate technique to perform open cholecystectomy.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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